Claims

[c1] A sortation system, comprising:

a sorter assembly for receiving product and for sorting that product to a series of sortation lines;

a slug-building assembly comprising a plurality of supply lines supplying product for sorting by said sorter assembly, at least one of said supply lines including an accumulation conveyor and a slug conveyor, said accumulation conveyor accumulating product in slug-portions comprising a plurality of product, said slug conveyor combining slug-portions into product slugs; and

wherein product slugs are discharged from said slug conveyor for sorting by said sorter assembly.

[c2] The sortation system of claim 1 including an impediment which has a first mode selectively holding back product on said accumulation conveyor thereby forming the slug-portions at said accumulation conveyor, said impediment having a second mode facilitating transfer of said slug-portions to said slug conveyor.

[c3] The sortation system of claim 2 wherein said impediment comprises at least one chosen from a brake belt and a product stop.

[c4] The sortation system of claim 3 including a power feed drawing gap between product in the slug-portions and subsequently closing the gap between product in the slug-portions prior to inclusion of that slug-portion in a slug.

[c5] The sortation system of claim 4 including detectors detecting the gap between product at said power-feed conveyor.

[c6] The sortation system of claim 1 including a power-feed conveyor drawing gap between products in slug-portions.

[c7] The sortation system of claim 6 wherein said power-feed conveyor substantially closes the gap between product in the slug-portions prior to inclusion of that slug-portion in a slug.

[c8] The sortation system of claim 6 including at least one product detector

detecting at least one parameter of the product at said slug-building assembly.

[c9] The sortation system of claim 8 wherein said at least one product detector is at said power-feed conveyor.

[c10] The sortation system of claim 1 including at least one product detector detecting at least one parameter of the product at said sortation assembly and a control receiving output of said at least one product detector and determining a sorter load parameter.

[c11] The sortation system of claim 10 wherein said control controls said slug-building assembling in response to said sorter load parameter.

[c12] The sortation system of claim 11 wherein said control determines a release parameter indicative of product ready to be released by said slug-building assembly.

[c13] The sortation system of claim 12 wherein said control compares said sorter load parameter with said release parameter and affects operation of said slug-building assembly as a function of said sorter load parameter and said release parameter, whereby the rate of product released by said slug-building assembly is matched with the rate of sortation of product at said sorter assembly.

[c14] The sortation system of claim 13 wherein, when said sorter load parameter is greater than said release parameter, said control restricts product slug-building.

[c15] The sortation system of claim 11 wherein said control causes said slug-building assembly to discharge at least one product slug at a speed that is a function of the sorter load parameter.

[c16] The sortation system of claim 1 including an induct providing controlled gap between the product supplied to said sorter assembly.

[c17] The sortation system of claim 16 including a transport conveyor between said slug-building assembly and said induct and wherein said control reduces a speed of said transport conveyor when said control reduces a speed of said

induct in response to an excessive product load.

[c18] The sortation system of claim 1 including at least one merge receiving product slugs discharged from said plurality of supply lines and combining the product slugs in a single file.

[c19] The sortation system of claim 1 wherein said slug conveyor comprises at least one belt conveyor.

[c20] The sortation system of claim 1 wherein said slug conveyor comprises another accumulation conveyor.

[c21] A sortation system, comprising:
a sorter assembly for receiving product and for sorting that product to a series of sortation lines;
a slug-building assembly which builds product slugs, wherein product slugs are discharged from said conveying surface and supplied for sortation by said sorter; and
a control, wherein said control determines a sorter time-based parameter indicative of a rate of product being sorted by said sortation assembly and wherein said control affects operation of said slug-building assembly as a function of said sorter time-based parameter, whereby the rate of product released by said slug-building assembly is matched with the rate of sortation of product at said sorter assembly.

[c22] The sortation system of claim 21 including at least one product detector for detecting at least one parameter of the product at said slug-building assembly.

[c23] The sortation system of claim 22 including at least one other product detector for detecting at least one parameter of the product at said sortation assembly, said control receiving outputs of said at least one product detector and said at least one other product detector.

[c24] The sortation system of claim 23 wherein said control compares said outputs of said at least one product detector and said at least one other product detector and controls said slug-building assembling in response to the comparison of

said outputs.

[c25] The sortation system of claim 23 wherein said sorter time parameter is a function of said at least one parameter of the product at said sorter assembly and said control determines a release time parameter that is a function of said at least one parameter of the product at said slug-building assembly.

[c26] The sortation system of claim 25 wherein, when said sorter time parameter is greater than said planned release time parameter, said control restricts product slug building.

[c27] The sortation system of claim 21 wherein said control causes said slug-building assembly to discharge at least one product slug at a speed that is a function of the sorter load parameter.

[c28] The sortation system of claim 21 including an induct providing controlled gap between the product supplied to said sorter assembly.

[c29] The sortation system of claim 28 including a transport conveyor between said slug-building assembly and said induct and wherein said control reduces a speed of said transport conveyor when said control reduces a speed of said induct.

[c30] The sortation system of claim 21 wherein said slug-building assembly comprises a plurality of supply lines supplying product to said induct, at least one of said supply lines including an accumulation conveyor and a slug conveyor, said accumulation conveyor accumulating product in slug-portions comprising a plurality of product, said slug conveyor combining slug-portions into product slugs.

[c31] The sortation system of claim 30 wherein said slug-building assembly restricts product in at least one product slug in response to said sorter parameter.

[c32] The sortation system of claim 30 wherein said slug-building assembly discharges product slugs at a speed that is a function of said sorter time parameter.

[c33] A sortation system, comprising:

a sorter assembly;

an induct supplying product to said sorter assembly with controlled gap between product; and

at least one supply line supplying product to said induct, said at least one supply line comprising a conveying surface which builds slugs of product and an accumulation conveyor which accumulates product and discharges product to said conveying surface to build slugs, wherein said conveying surface receives product from said accumulation conveyor at a first continuous speed to build slugs and discharges slugs of product at a second speed that is substantially higher than said first speed.

[c34] The system of claim 33 wherein said conveying surface comprises at least one belt conveyor.

[c35] The system of claim 33 wherein said conveying surface comprises another accumulation conveyor.

[c36] The system of claim 33 wherein said induct comprises a single-line induct.

[c37] The system of claim 33 including a discharge conveyor which receives slugs of product from said at least one supply line.

[c38] The system of claim 37 wherein said discharge conveyor operates at a third speed that is higher than said second speed.

[c39] The system of claim 38 further including a merge conveyor which selectively receives product from said at least one supply line and supplies product to said induct.

[c40] The system of claim 39 wherein said merge conveyor operates at a fourth speed that is higher than said third speed.

[c41] A method of sorting product, comprising:

providing a sorter assembly and sorting product to a series of sortation lines with said sortation assembly;

providing a slug-building assembly comprising a plurality of supply lines

supplying product for sorting by said sorter assembly, at least one of said supply lines including an accumulation conveyor and a slug conveyor;
accumulating product in slug-portions comprising a plurality of product with said accumulation conveyor;
combining slug-portions into product slugs with said slug conveyor; and
discharging product slugs from said slug conveyor and sorting the product of the discharged product slugs with said sortation assembly.

[c42] The method of claim 41 including providing an impediment and selectively holding back product on said accumulating conveyor to form the slug-portions and selectively facilitating transfer of said product slug-portions from said accumulation conveyor to said slug conveyor.

[c43] The method of claim 42 wherein said impediment comprises at least one chosen from a brake belt and a product stop.

[c44] The method of claim 43 including providing a power feed and drawing gap between product in the slug-portions and subsequently substantially closing the gap between product in the slug-portions prior to inclusion of that slug-portion in a slug.

[c45] The method of claim 44 including detectors detecting the gap between product at said power-feed conveyor.

[c46] The method of claim 41 including providing a power-feed conveyor and drawing gap between products in the slug-portions with said power-feed conveyor.

[c47] The method of claim 46 including substantially closing the gap between product in the slug-portions with said power-feed conveyor prior to inclusion of that slug-portion in a slug.

[c48] The method of claim 46 including detecting at least one parameter of the product at said slug-building assembly.

[c49] The method of claim 48 including detecting said at least one parameter of the product at said power feed conveyor.

[c50] The of claim 41 including detecting at least one parameter of the product at said sortation assembly.

[c51] The method of claim 50 including controlling said combining slug-portions in response to said at least one parameter.

[c52] The method of claim 50 including determining a sorter parameter from said at least one other parameter, said sorter parameter indicative of the rate of product being sorted.

[c53] The method of claim 52 including comparing said sorter parameter with a release parameter indicative of product ready to be released by said slug-building assembly and controlling said slug-building assembly at least as a function of said sorter parameter and said release parameter, whereby the rate of product released by said slug-building assembly is matched with the rate of sortation of product at said sorter assembly.

[c54] The method of claim 53 including restricting product slug building when said sorter time parameter is greater than said release time parameter.

[c55] The method of claim 53 including discharging of at least one product slug from said slug-building assembly at a speed that is a function of the at least one parameter.

[c56] The method of claim 41 including providing an induct and providing controlled gap between product supplied to said sorter assembly with said induct.

[c57] The method of claim 56 including providing a transport conveyor between said slug-building assembly and said induct and reducing a speed of said transport conveyor when a speed of said induct is reduced.

[c58] The method of claim 57 including providing at least one merge receiving product slugs discharged from said plurality of supply lines and combining the product slugs in a single file.

[c59] The method of claim 41 wherein said slug conveyor comprises at least one belt conveyor.

[c60] The method of claim 41 wherein said slug conveyor comprises another accumulation conveyor.

[c61] A method of sorting product, comprising:
providing a sorter assembly and sorting product to a series of sortation lines with said sorter assembly; and
providing a slug-building assembly and building product slugs with said slug-building assembly for sorting by said sorter assembly, including determining a sorter time parameter indicative of the rate of product being sorted, and controlling said slug-building assembly at least as a function of said sorter time parameter, whereby the rate of product released by said slug-building assembly is matched with the rate of sortation of product at said sorter assembly.

[c62] The method of claim 61 including detecting at least one parameter of the product at said slug-building assembly.

[c63] The method of claim 62 including detecting at least one other parameter of the product at said sorter assembly.

[c64] The method of claim 63 including comparing said at least one parameter with said at least one other parameter and controlling said slug-building assembling in response to the comparison.

[c65] The method of claim 64 wherein said sorter time parameter is a function of said at least one parameter of the product at said sorter assembly and said release time parameter is a function of said at least one parameter of the product at said slug-building assembly.

[c66] The method of claim 65 including restricting product slug building at said slug-building assembly when said sorter time parameter is greater than said release time parameter.

[c67] The method of claim 61 including discharging from said slug-building assembly at least one product slug at a speed that is a function of the comparison.

[c68] The method of claim 61 including providing an induct and providing controlled gap between product supplied to said sorter assembly with said induct.

[c69] The method of claim 68 including providing a transport conveyor between said slug-building assembly and said induct and reducing a speed of said transport conveyor when the speed of said induct is reduced.

[c70] The method of claim 61 wherein said slug-building assembly comprises a plurality of supply lines supplying product to said induct, at least one of said supply lines including an accumulation conveyor and a slug conveyor, said accumulation conveyor accumulating product in slug-portions comprising a plurality of product, said slug conveyor combining slug-portions into product slugs.

[c71] The method of claim 70 including restricting product in at least one product slug at said slug conveyor in response to said sorter parameter being greater than said planned release parameter.

[c72] The method of claim 70 including discharging product slugs at a speed that is a function of said sorter time parameter and said release time parameter.

[c73] A method of sorting product, comprising:

providing a sorter assembly and sorting product with said sorter assembly;
providing an induct and supplying product to said sorter assembly with said induct with controlled gap between product;
building slugs of product on at least one conveying surface by accumulating product on an accumulation conveyor and receiving product on said conveying surface from said accumulation conveyor, including receiving product on said at least one conveying surface from said accumulation conveyor at a first substantially continuous speed to build slugs and discharging slugs of product from said at least one conveying surface at a second speed that is substantially higher than said first speed; and
providing controlled gaps between product discharged from said at least one conveying surface.

[c74] The method of claim 73 wherein said conveying surface comprises at least one belt conveyor.

[c75] The method of claim 73 wherein said conveying surface comprises another

accumulation conveyor.

[c76] The method of claim 73 including providing controlled gaps between product with a single-line induct.

[c77] The method of claim 73 including providing a discharge conveyor and receiving a slug of product with said discharge conveyor from said at least one supply line.

[c78] The method of claim 77 including operating said discharge conveyor at a third speed that is higher than said second speed.

[c79] The method of claim 78 including providing a merge conveyor and selectively receiving product with said merge conveyor from said at least one supply line and supplying product to said induct.

[c80] The method of claim 79 including operating said merge conveyor at a fourth speed that is higher than said third speed.

[c81] A sortation system, comprising:
a sorter assembly for receiving product and for sorting that product to a series of sortation lines;
a slug-building assembly comprising a plurality of supply lines supplying product to said induct, at least one of said supply lines including an accumulation conveyor and a slug conveyor, said accumulation conveyor accumulating product in slug-portions comprising a plurality of product, said accumulation conveyor conveying said slug-portions and said slug conveyor combining slug-portions into product slugs with said accumulation conveyor and said slug conveyor operating substantially continuously at a first speed; and
wherein product slugs are discharged from said slug conveyor operating substantially continuously at a second speed that is higher than said first speed for sorting by said sorter assembly.

[c82] A method of sorting product, comprising:
providing a sorter assembly and sorting product to a series of sortation lines with said sorter assembly;

providing a slug-building assembly comprising a plurality of supply lines supplying product to said induct, at least one of said supply lines including an accumulation conveyor and a slug conveyor, accumulating product in slug-portions comprising a plurality of product with said accumulation conveyor, combining slug-portions into product slugs with said slug conveyor by operating said accumulation conveyor and said slug conveyor operating substantially continuously at a first speed; and

discharging product slugs from said slug conveyor operating substantially continuously at a second speed that is higher than said first speed and sorting the product of the discharged product slugs with said sorter assembly.